



DEPARTMENT OF ENERGY
Federal Energy Regulatory Commission

[Docket No. RD22-4-000]

Before Commissioners: Richard Glick, Chairman;
James P. Danly, Allison Clements,
Mark C. Christie, and Willie L. Phillips;

Registration of Inverter-based Resources;

Registration of Inverter-Based Resources

1. In order to address concerns regarding the reliability impacts of inverter-based resources (IBR)¹ on the Bulk-Power System,² the Commission directs the North American Electric Reliability Corporation (NERC) to submit a work plan within 90 days of the issuance of this order describing, in detail, how it plans to identify and register owners and operators of IBRs that are connected to the Bulk-Power System, but are not currently required to register with NERC under the bulk electric system (BES) definition³ (referred

¹ This order uses the term IBRs to include all generating facilities that connect to the electric power system using power electronic devices that change direct current (DC) power produced by a resource to alternating current (AC) power compatible with distribution and transmission systems. This order does not address IBRs connected to the distribution system.

² The Bulk-Power System is defined in the Federal Power Act (FPA) as facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof), and electric energy from generating facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy. 16 U.S.C. 824o(a)(1).

³ NERC's Commission-approved BES definition is a subset of the Bulk-Power System and defines the scope of the Reliability Standards and the entities subject to NERC compliance. *Revisions to Elec. Reliability Org. Definition of Bulk Elec. Sys. & Rules of Proc.*, Order No. 773, 78 FR 804 (Jan. 4, 2013), 141 FERC ¶ 61,236 (2012), *order on reh'g*, Order No. 773-A, 78 FR 29209 (May 17, 2013), 143 FERC ¶ 61,053 (2013) *rev'd sub nom. People of the State of N. Y. v. FERC*, 783 F.3d 946 (2d Cir. 2015) (rejecting New York's challenge to the presumptive threshold for local distribution lines at 100 kV, adopted for implementing Reliability Standards for the Bulk-Power System); NERC, *Glossary of Terms Used in NERC Reliability Standards*, 5-7 (Mar. 29, 2022), https://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf (NERC Glossary).

to as “unregistered IBRs” throughout this order) that have an aggregate,⁴ material impact on the reliable operation of the Bulk-Power System. The work plan should explain how NERC will modify its processes to address unregistered IBRs (whether by working with stakeholders to change the BES definition, a change to its registration program, or some other solution) within 12 months of approval of the work plan. The work plan should also include implementation milestones ensuring that owners and operators meeting the new registration criteria are identified within 24 months of the approval date of the work plan, and that they are registered and required to comply with applicable Reliability Standards within 36 months of the approval date of the work plan. The work plan will be noticed for public comment. Once the Commission approves the proposed work plan, we direct NERC to file progress updates every 90 days thereafter detailing NERC’s progress towards identifying and registering owners and operators of unregistered IBRs.

2. The Bulk-Power System generation resource mix is undergoing a rapid change, including the projected addition over the next decade of an “unprecedented proportion of nonsynchronous resources,”⁵ i.e., IBRs. According to NERC, the rapid integration of IBRs is “the most significant driver of grid transformation” on the Bulk-Power System.⁶ However, despite the potential for IBRs to have a significant aggregate impact on the Bulk-Power System, many of the owners and operators of these individual resources are not required to register with NERC or comply with NERC’s mandatory Reliability Standards.

3. To identify which Bulk-Power System users, owners, and operators must register with NERC and comply with mandatory Reliability Standards, NERC applies its Commission-approved definition of BES. This definition identifies elements⁷ and groups of elements, including generation elements, that are necessary for the reliable planning and operation of the Bulk-Power System. The BES definition includes a “bright line” for

⁴ This order focuses on unregistered IBRs that may have smaller individual capacities but which, when considered together or in the aggregate, have a material impact on the reliability of the Bulk-Power System. Pursuant to its registration program, NERC may already register resources that have an individual material impact.

⁵ NERC, *2020 Long Term Reliability Assessment Report*, 9 (Dec. 2020), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2020.pdf.

⁶ NERC, *Inverter-Based Resource Strategy: Ensuring Reliability of the Bulk Power System with Increased Levels of BPS-Connected IBRs*, 1 (Sep. 14, 2022), https://www.nerc.com/comm/Documents/NERC_IBR_Strategy.pdf (NERC IBR Strategy).

⁷ “Element” is defined in the NERC Glossary as: “Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An element may be comprised of one or more components.” NERC Glossary at 11.

identifying all transmission elements operated at 100 kV or higher and real and reactive power resources connected at 100 kV or higher. After applying the bright line, the BES definition also lists a series of exceptions to the bright line that NERC may apply to either include within the BES elements that fall below the bright line (inclusions), or to exclude elements from the BES that meet the bright line (exclusions). The BES definition does not include facilities used in the local distribution of electric energy. Entities that use, own, or operate elements of NERC's approved definition of BES are users, owners, and operators of the Bulk-Power System and candidates for registration.⁸

4. Unregistered IBRs connecting to the Bulk-Power System do not meet the current BES definition, are not registered with NERC, and are not required to comply with Reliability Standards.⁹ While NERC has the capability to individually register unregistered IBRs connected to the Bulk-Power System through its materiality test, a non-exclusive series of factors used to assess whether an element has a material impact on reliability,¹⁰ NERC's materiality test is typically used to assess an individual entity's material impact and not the aggregate impact of a class of facilities. NERC has not, to date, applied the materiality test to unregistered IBRs to determine whether they have an aggregate material impact on the reliable operation of the Bulk-Power System.

5. In a series of reports detailing grid disturbances over the past six years, NERC has determined that the operational characteristics of IBRs, regardless of size, coupled with their equipment settings, may cause IBRs to reduce power output, whether by tripping offline¹¹ or ceasing operation without tripping offline (known as "momentary cessation"),¹² both individually and in the aggregate, in response to a single fault on a

⁸ NERC Rules of Procedure, App. 5B (Statement of Compliance Registry) at 4.

⁹ NERC, *Improvements to Interconnection Requirements for BPS-Connected Inverter-Based Resources*, at 1, (Sept. 2019) (IBR Interconnection Requirements Guideline) (reporting that the majority of newly interconnecting IBRs are either connecting at voltages less than 100 kV or with capacity less than 75 MVA and therefore do not meet the size criteria in the BES definition). All NERC Guidelines referenced in this order are available on NERC's website at <https://www.nerc.com/comm/Pages/Reliability-and-Security-Guidelines.aspx>.

¹⁰ See NERC Rules of Procedure, App. 5B at 7-8 (listing a non-exclusive set of factors (materiality test) for consideration in registration decisions).

¹¹ Tripping offline is a mode of operation during which part of or the entire IBR disconnects from the Bulk-Power System and therefore cannot supply real and reactive power.

¹² Momentary cessation is a mode of operation during which the inverter remains electrically connected to the Bulk-Power System, but the inverter does not inject current during low or high voltage conditions outside the continuous operating range. As a result, there is no current injection from the inverter and therefore no active or reactive current (and no active or reactive power). NERC, *Reliability Guideline BPS-Connected Inverter-Based Resource Performance*, 11 (Sept. 2018) (IBR Performance Guideline).

transmission or sub-transmission system.¹³ For example, in the San Fernando Disturbance Report, NERC found that many of the facilities that unexpectedly and adversely responded to the fault events were “non-BES solar PV [IBRs] that had a noticeable effect on [Bulk-Power System] performance in aggregate.”¹⁴ This aggregate impact may occur when individual IBRs’ controls and equipment protection settings are not configured or programmed to ride through¹⁵ system disturbances.¹⁶ These reports demonstrate that the potential for IBRs to have a material impact on the Bulk-Power System is not limited to larger IBRs that are typically required to register with NERC or to the IBRs within an individual balancing authority area. Additionally, simulations indicate that aggregate IBRs experiencing momentary cessation can lead to instability, uncontrolled separation, and voltage collapse.¹⁷ In areas of high IBR saturation, simulations indicate that this type of response may have an impact much greater than the most severe single contingency (i.e., the traditional worst-case N-1 contingency)¹⁸ of a balancing authority area, potentially impacting a widespread area.¹⁹

¹³ NERC’s IBR disturbance event reports indicate that unregistered Bulk-Power System connected solar and wind IBRs (unregistered IBRs) experience identical power reduction and power loss issues. All NERC event reports referenced in this order are available on NERC’s website at <https://www.nerc.com/pa/rm/ea/Pages/Major-Event-Reports.aspx>.

¹⁴ NERC and WECC, *San Fernando Disturbance*, 23 (Nov. 2020) (San Fernando Disturbance Report). While various NERC reports refer to “non-BES” to describe IBRs that fall below the BES definition threshold, we understand this term to be synonymous with “unregistered IBRs.”

¹⁵ See *Standardization of Generator Interconnection Agreements and Procedures*, Order No. 2003, 68 FR 49846 (Aug. 19, 2003), 104 FERC ¶ 61,103, at P 562 n.88 (2003) (defining ride through as “a Generating Facility staying connected to and synchronized with the Transmission System during system disturbances within a range of over- and under-frequency[/voltage] conditions, in accordance with Good Utility Practice.”).

¹⁶ See e.g., NERC and WECC, *900 MW Fault Induced Solar Photovoltaic Resource Interruption Disturbance Report*, 19 (Feb. 2018) (Canyon 2 Fire Event Report) (finding momentary cessation as a major cause for the loss of IBRs when voltages rose above 1.1 per unit or decreased below 0.9 per unit).

¹⁷ NERC, *Resource Loss Protection Criteria Assessment Whitepaper*, at 1-2, key findings 4, 7, 8 (Feb. 2018), https://www.nerc.com/comm/PC/InverterBased%20Resource%20Performance%20Task%20Force%20IRPT/IRPTF_RLPC_Assessment.pdf.

¹⁸ The most severe single contingency or the N-1 contingency generally refers to the concept that a system must be able to withstand an unexpected failure or outage of a single system component and maintain reliable service at all times. See NERC Glossary at 17 (defining “most severe single contingency”).

¹⁹ See, e.g., San Fernando Disturbance Report at vi (stating that “[t]his event, as

6. Therefore, we find that it is necessary to ensure that unregistered IBRs that may have an aggregate material impact on the reliable operation of the Bulk-Power System are required to: (1) register with NERC, and (2) comply with NERC Reliability Standards. Hence, we direct NERC, pursuant to our authority under FPA section 215,²⁰ to submit for Commission approval within 90 days a work plan describing in detail how NERC plans to identify and register unregistered IBRs that, in the aggregate, have a material impact on the reliable operation of the Bulk-Power System. The work plan should explain how NERC will modify its processes to encompass unregistered IBRs (whether by working with stakeholders to change the BES definition, a change to its registration program, or some other solution) within 12 months of approval of the work plan. The work plan should also include implementation milestones ensuring that unregistered IBR owners and operators meeting the new registration criteria are identified within 24 months of the approval date of the work plan, and that they are registered and required to comply with applicable Reliability Standards within 36 months of the approval date of the work plan. The work plan will be noticed for public comment. Once the Commission approves the work plan, NERC must file updates every 90 days thereafter detailing its progress towards identifying and registering owners and operators of IBRs (e.g., the number or percentage of entities identified and/or registered and anticipated completion date if changed, with an explanation of any such change).

7. In view of the rapid growth of IBRs and their potential to materially impact the reliability of the Bulk-Power System (including the potential for unregistered IBRs to materially impact the reliability of the Bulk-Power System in the aggregate), we are issuing this order concurrently with a notice of proposed rulemaking that preliminary finds that the Reliability Standards do not fully address the impacts of IBRs on the reliable operation of the Bulk-Power System and that proposes to direct NERC to create new or modified Reliability Standards that address reliability concerns pertaining to IBRs.²¹ Together, these actions are necessary to ensure that the ongoing integration of IBRs does not adversely impact the reliable operation of the Bulk-Power System.

with past events, involved a significant number of solar photovoltaic (PV) resources reducing power output (either due to momentary cessation or inverter tripping) as a result of normally-cleared [Bulk-Power System] faults. The widespread nature of power reduction across many facilities poses risks to [Bulk-Power System] performance and reliability.”).

²⁰ 16 U.S.C. 824o(b)(1). *See also* 18 CFR 39.2(d) (2021) (the ERO shall provide the Commission information as necessary to implement section 215 of the FPA).

²¹ *Reliability Standards to Address Inverter-based Resources*, 181 FERC ¶ 61,125 (2022).

I. Background

A. Section 215 of the FPA

8. Section 215 of the FPA provides that the Commission may certify an Electric Reliability Organization (ERO), the purpose of which is to establish and enforce Reliability Standards, subject to Commission review and approval.²² Once approved, the Reliability Standards may be enforced by the ERO, subject to Commission oversight, or by the Commission independently.²³ Pursuant to section 215 of the FPA, the Commission established a process to select and certify an ERO,²⁴ and subsequently certified NERC.²⁵

B. NERC Registration

9. The Commission's regulations require each user, owner, and operator of the Bulk-Power System to be registered with the ERO and to comply with applicable Reliability Standards.²⁶ NERC registers users, owners, and operators of the Bulk-Power System through either application of its BES definition or its materiality test.²⁷ As explained by NERC's Rules of Procedure, "any entity reasonably deemed material to the reliability of the [Bulk-Power System] will be registered, irrespective of other considerations."²⁸ NERC determines whether an entity is "deemed material" through either application of its BES definition or its materiality test to an entity's facilities and elements. Once an entity is identified as a candidate for registration, the functions it normally performs are compared to a list of function type definitions.²⁹ NERC registers

²² 16 U.S.C. 824o.

²³ *Id.* 824o(e)(3).

²⁴ *Rules Concerning Certification of the Elec. Reliability Org.; and Procs. for the Establishment, Approval, & Enforcement of Elec. Reliability Standards*, Order No. 672, 71 FR 8662 (Feb. 17, 2006), 114 FERC ¶ 61,104, *order on reh'g*, Order No. 672-A, 71 FR 19814 (Apr. 18, 2006), 114 FERC ¶ 61,328 (2006).

²⁵ *N. Am. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (2006), *order on reh'g and compliance*, 117 FERC ¶ 61,126 (2006) *aff'd sub nom. Alcoa Inc. v. FERC*, 564 F.3d

1342 (D.C. Cir. 2009) (certifying NERC as the ERO responsible for the development and enforcement of mandatory Reliability Standards).

²⁶ 18 CFR 39.2 (c).

²⁷ NERC Rules of Procedure, App. 5B at 3. *See id.* at 7-8 (listing the criteria for determining which entities that have a "material impact").

²⁸ *Id.*

²⁹ *Id.* at 5.

these Bulk-Power System users, owners, and operators by the reliability functions they perform (e.g., generator owner or generator operator),³⁰ and to which specific requirements of the mandatory Reliability Standards are applicable.³¹

10. NERC's registration criteria also allow NERC to limit the compliance obligations of a given entity registered for a particular function or of a similarly-situated class of entities, as warranted based on the particular facts and circumstances, to a subset of Reliability Standards or requirements.³² For example, an entity that owns underfrequency load shedding (UFLS) protection equipment needed to implement a required UFLS program designed for the protection of the BES, but that does not meet any of the other registration criteria for a distribution provider, would be registered as a "UFLS-only distribution provider" and only be required to comply with a subset of the Reliability Standards normally required for registered distribution providers.³³

C. Bulk Electric System Definition

11. On March 16, 2007, in Order No. 693, pursuant to section 215(d) of the FPA, the Commission approved 83 of 107 proposed Reliability Standards and the Glossary of Terms Used in NERC Reliability Standards (NERC Glossary), which included an early version of NERC's BES definition.³⁴ The Commission observed that the NERC BES definition omitted "significant portions of the transmission system component[s] of the Bulk-Power System"³⁵ but declined to direct NERC at that time to revise its BES definition. The Commission stated that it would, for at least an initial period, rely on the NERC BES definition to determine the applicability of the Reliability Standards; however, the Commission noted that it "remains concerned about the need to address the potential for gaps in coverage of facilities."³⁶

³⁰ See NERC, *Active Entities List* (updated Oct. 3, 2022), https://www.nerc.com/pa/comp/Registration%20and%20Certification%20DL/NERC_Co Compliance_Registry_Matrix_Excel.xlsx.

³¹ Each Reliability Standard includes an applicability section that identifies the specific functional entity or subset of functional entities responsible for compliance with that standard.

³² NERC Rules of Procedure, App. 5B at 8.

³³ *Id.* at 7.

³⁴ *Mandatory Reliability Standards for the Bulk-Power Sys.*, Order No. 693, 72 FR 16416 (Apr. 4, 2007), 118 FERC ¶ 61,218 *order on reh'g*, Order No. 693-A, 72 FR 40717 (July 25, 2007), 120 FERC ¶ 61,053 (2007).

³⁵ Order No. 693, 118 FERC ¶ 61,218 at P 54.

³⁶ *Id.* PP 75-76.

12. On November 18, 2010, in Order No. 743, the Commission directed NERC to revise its definition of the term BES to ensure that the definition encompasses all facilities necessary for operating an interconnected transmission network.³⁷ The Commission concluded that the best way to accomplish this was to eliminate the Regional Entity discretion to define the BES without NERC or Commission review, maintain a bright-line threshold that includes all facilities operated at or above 100 kV except radial facilities,³⁸ and adopt an exemption process and criteria for removing from the BES facilities that are not necessary for operating the interconnected transmission network. In Order No. 743, the Commission allowed NERC to “propose a different solution that is as effective as, or superior to, the Commission’s proposed approach in addressing the Commission’s technical and other concerns so as to ensure that all necessary facilities are included within the scope of the definition.”³⁹

13. On January 25, 2012, NERC submitted two petitions to revise its BES definition and Rules of Procedure pursuant to the directives in Order No. 743, including: (1) NERC’s proposed revision to the definition of BES with a “core” definition (i.e., the 100 kV bright line) and provisions that include and exclude specific categories of facilities within the BES irrespective of the bright line;⁴⁰ and (2) revisions to NERC’s Rules of Procedure to add an exception process to classify or de-classify an element as part of the BES on a case-by-case basis.⁴¹ On December 20, 2012, in Order No. 773, the Commission approved the revisions to the BES definition and the NERC Rules of Procedure exception process.⁴²

14. NERC uses the BES definition to identify which users, owners, and operators of the Bulk-Power System should be registered by first using the BES definition bright-line (i.e., all elements connected at 100 kV or higher). After the bright line, additional elements may be identified as BES elements by applying one or more of the five “Inclusions” that make up the BES definition.⁴³

³⁷ *Revision to Elec. Reliability Org. Definition of Bulk Elec. System*, Order No. 743, 75 FR 72910 (Nov. 26, 2010), 133 FERC ¶ 61,150, at P 16 (2010), *order on reh’g*, Order No. 743-A, 76 FR 16263 (Mar. 23, 2011), 134 FERC ¶ 61,210 (2011).

³⁸ *Id.* Order No. 743 uses “defined radial facilities” to mean those radial transmission facilities serving only load with one transmission source.

³⁹ *Id.*

⁴⁰ *N. Am. Elec. Reliability Corp.*, Docket No. RM12-6-000 (filed Jan. 25, 2012).

⁴¹ *N. Am. Elec. Reliability Corp.*, Docket No. RM12-7-000 (filed Jan. 25, 2012).

⁴² Order No. 773, 141 FERC ¶ 61,236.

⁴³ The five inclusions are: (1) I1 – Transformers; (2) I2 – Generating Resources; (3) I3 – Blackstart Resources; (4) I4 – Dispersed Power Producing Resources; and (5) Static or Dynamic Devices. The NERC Glossary includes additional detail on what

15. On December 13, 2013, NERC filed proposed revisions to the BES definition to, among other things, address Commission directives in Order Nos. 773 and 773-A to improve the BES definition inclusions and exclusions.⁴⁴ On March 20, 2014, the Commission approved modifications to the BES definition inclusions and exclusions to ensure that generator interconnection facilities at or above 100 kV connected to BES generators identified in inclusion I2 (generating resources connected at a voltage of 100 kV or above with either a gross individual nameplate rating above 20 MVA or a gross plant/facility nameplate rating greater than 75 MVA) are not excluded from the BES.⁴⁵ The Commission also approved revisions to inclusion I4 to include collector systems from the point where the generation aggregates to greater than 75 MVA to a common point of connection at a voltage of 100 kV or above.⁴⁶

16. The inclusions relevant for IBRs are inclusions I2 (generating resources) and I4 (dispersed power producing resources),⁴⁷ which are defined as follows:

I2 – Generating resource(s) including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above with: a) Gross individual nameplate rating greater than 20 MVA. Or, b) Gross plant/facility aggregate nameplate rating greater than 75 MVA.

I4 – Dispersed power producing resources that aggregate to a total capacity greater than 75 MVA (gross nameplate rating), and that are connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage of 100 kV or above. Thus, the facilities designated as BES are: a) The individual resources, and b) The system designed primarily for delivering capacity from the point where those resources aggregate to greater than 75 MVA to a common point of connection at a voltage of 100 kV or above.

17. Further, in approving revisions to NERC's BES definition in Order No. 773, the Commission recognized its authority under section 215 of the FPA to designate an

specific configurations are covered by these inclusions. NERC Glossary at 5-7.

⁴⁴ *N. Am. Elec. Reliability Corp.*, Docket No. RD14-2-000, at 2 (filed Dec. 13, 2013).

⁴⁵ *N. Am. Elec. Reliability Corp.*, 146 FERC ¶ 61,199, at P 8 (2014).

⁴⁶ *Id.* P 19.

⁴⁷ The Commission approved NERC's clarification that inclusion I4's dispersed power producing resources includes variable generation resources in light of "the increasing presence of wind, solar, and other non-traditional forms of generation." The Commission recognized that these individual variable generation units should be included within the scope of the BES "where necessary to support reliability." *Id.* P 47.

element as part of the BES.⁴⁸ The Commission went on to explain that “where an event analysis of a system disturbance indicates the operational importance of sub-100 kV elements . . . to reliability, the Commission may find it necessary for the reliable operation of the interconnected transmission network to designate facilities to be included in the bulk electric system.”⁴⁹ The Commission also explained that it would expect in the normal course that registered entities, Regional Entities, and NERC would proactively identify and include those sub-100 kV elements (including generation elements) in the BES.⁵⁰ But in the case that another entity does not initiate the registration of such facilities, the Commission stated it would exercise its authority to do so.⁵¹

D. NERC Determination of Material Impact

18. An entity that does not have elements that fall within the BES definition may nevertheless be registered if it can be demonstrated that the entity has a material impact on Bulk-Power System reliability. To determine whether users, owners, and operators of facilities and elements that fall outside the BES definition are material to Bulk-Power System reliability and must be registered, NERC uses a non-exclusive set of factors (materiality test).⁵² NERC recognizes that only a subset of the materiality test factors may be applicable to particular functional registration categories when determining whether a facility should be registered or deregistered.⁵³ All such registration decisions regarding materiality must be made by a NERC-led registration review panel.⁵⁴

19. Relevant to IBRs, the factors for determining material impact include the following:

Will intentional or inadvertent removal of an Element owned or operated by the entity, or a common mode failure of two Elements as identified in the Reliability Standards (for example, loss of two Elements as a result of a

⁴⁸ Order No. 773, 141 FERC ¶ 61,236 at P 285 (citing authority under FPA sections 215(a)(1) and (b)(1)).

⁴⁹ *Id.*

⁵⁰ *Id.* P 288.

⁵¹ *Id.*

⁵² NERC Rules of Procedure, App. 5B at 7-8.

⁵³ *Id.* at 7.

⁵⁴ *Id.* The NERC-led registration review panel is comprised of a NERC lead with Regional Entity participants. The panel evaluates requests to de-register entities meeting registration criteria, requests to add an entity that does not meet registration criteria, disputes regarding application of registration criteria, and requests for subset lists of applicable Reliability Standards. NERC Rules of Procedure, App. 5A (Organization Registration and Certification Manual) at 10.

breaker failure), lead to a reliability issue on another entity's system (such as a neighboring entity's Element exceeding an applicable rating, or loss of non-consequential load due to a single contingency)? Conversely, will such contingencies on a neighboring entity's system result in issues for Reliability Standards compliance on the system of the entity in question?

. . . .

Can the normal operation, misoperation, or malicious use of the entity's Protection Systems (including UFLS [under frequency load shedding], UVLS [under voltage load shedding], Special Protection System, Remedial Action Schemes and other Protection Systems protecting BES Facilities) cause an adverse impact on the operational reliability of any associated Balancing Authority, Generator Operator or Transmission Operator, or the automatic load shedding programs of a PC [planning coordinator] or TP [transmission planner] (UFLS, UVLS)?⁵⁵

II. Discussion

20. We are issuing this order to ensure that timely action is taken to address the reliability challenges presented by IBRs because their individual and aggregate impacts can exacerbate disturbances on the Bulk-Power System. Such impacts are well documented in studies of Bulk-Power System disturbances over the past six years, as discussed below. The rapid growth of IBRs will make these impacts more acute over time unless they are adequately addressed. Accordingly, we direct NERC within 90 days of the date of issuance of this order to develop and submit for Commission approval a work plan describing, in detail, how NERC will identify and register owners and operators of unregistered IBRs that in the aggregate materially impact the reliable operation of the Bulk-Power System.

21. NERC should explain in its work plan how NERC will modify its processes to encompass unregistered IBRs (whether by working with stakeholders to change the BES definition, a change to its registration program, or some other solution) within 12 months of approval of the work plan. The work plan should also include implementation milestones ensuring that unregistered IBR owners and operators meeting the new registration criteria are identified within 24 months of the approval date of the work plan, and they are registered and required to comply with applicable Reliability Standards within 36 months of the approval date of the work plan. The work plan will be noticed for public comment. Once the Commission approves the proposed work plan, we direct NERC to file progress updates every 90 days thereafter detailing NERC's progress towards modifying its processes and, once the modification is complete, every 90 days thereafter detailing its progress towards identifying and registering owners and operators of unregistered IBRs.

⁵⁵ NERC Rules of Procedure, App. 5B at 7-8.

22. IBRs are rapidly becoming a principal source of electric power,⁵⁶ and in certain areas of the Bulk-Power System the IBR saturation is significant enough that their operations can materially impact Bulk-Power System reliability. As their contribution to the resource mix continues to increase, IBRs present new considerations for transmission planning and operation of the Bulk-Power System, which was designed primarily for synchronous generation.⁵⁷ Like synchronous generators, IBRs such as solar PV, wind, fuel cells, and battery storage produce real and reactive power; however, they do not react to disturbances on the transmission system in the same manner as synchronous generators do. As discussed below, the operational characteristics and equipment settings of IBRs have in some instances exacerbated system disturbances both individually and in the aggregate, and the status quo presents a risk to Bulk-Power System reliability.

23. Unregistered IBRs often have small individual generation capacities, are connected to the Bulk-Power System at less than 100 kV transmission or sub-transmission voltages, and do not meet one of the inclusions in the BES definition. NERC's materiality test⁵⁸ includes an assessment of material impact for individual entities; however, it has not been used to determine whether unregistered IBRs can, in the aggregate, have a material impact on the Bulk-Power System such that their owners or operators should be registered with NERC. As discussed below, the aggregate impact of unregistered IBRs is not directly addressed by the BES definition or the materiality test, meaning that the users, owners, and operators of those unregistered IBRs are not required to register with NERC and therefore are not required to comply with Reliability Standards.

A. Unregistered IBRs Continue to Exacerbate Disturbance Events on the Bulk-Power System

24. The first documented large-scale reliability issues related to IBRs occurred in August of 2016 during the Blue Cut Fire event in California. Until this event, the likelihood of IBRs tripping or momentarily ceasing during faults on the Bulk-Power System was unclear. Since the Blue Cut Fire, at least 11 additional NERC-documented

⁵⁶ See NERC, *2021 Long Term Reliability Assessment Report*, 29 (Dec. 2021). https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2021.pdf. In the report, NERC projects IBR nameplate capacity additions of approximately 504 GW of solar and 360 GW of wind (i.e., a total nameplate capacity of 864 GW) and cumulative retirements of approximately 60 GW of nuclear, coal, natural gas, and biomass to the Bulk-Power System over the next decade.

⁵⁷ See e.g., NERC, *2012 Special Assessment Interconnection Requirements for Variable Generation*, 1 (Sept. 2012), https://www.nerc.com/files/2012_IVGTF_Task_1-3.pdf (finding that “many of NERC’s existing interconnection standards and procedures have been based on technical characteristics and physical capabilities of traditional power generation resources that employ synchronous generators”).

⁵⁸ NERC Rules of Procedure, App. 5B at 7-8.

events⁵⁹ have demonstrated common mode failures of IBRs acting unexpectedly and adversely in response to normally cleared transmission line faults on the Bulk-Power System.⁶⁰ Most of the early NERC reports, however, do not provide IBR nameplate capacity of the facilities involved. Without a breakdown of unregistered IBR and IBR nameplate capacities we are unable to determine what percentage of the elements involved were unregistered IBRs. Later studies of IBR-related disturbance events indicate that a loss of real power generation from unregistered IBRs contributed to the total resource loss during these disturbances.⁶¹

25. On July 7, 2020, two consecutive faults in northern Los Angeles county, California resulted in the wide-spread interruption of solar PV IBRs across the Southern California region, referred to as the “San Fernando Disturbance.”⁶² Those faults included an approximately 205 MW power reduction followed by a 1,000 MW

⁵⁹ These 12 events report an average of approximately 1,000 MW of IBRs entering into momentary cessation or tripping in the aggregate. *See* Blue Cut Fire Event Report (covering the Blue Cut Fire (August 16, 2016)); Canyon 2 Fire Event Report (covering the Canyon 2 Fire (October 9, 2017)); NERC and WECC, *April and May 2018 Fault Induced Solar Photovoltaic Resource Interruption Disturbances Report* (Jan. 2019) (Angeles Forest and Palmdale Roost Events Report) (covering the Angeles Forest (April 20, 2018) and Palmdale Roost (May 11, 2018) events); San Fernando Disturbance Report (covering the San Fernando Event (July 7, 2020)); NERC and Texas RE, *Odessa Disturbance* (Sept. 2021) (Odessa Disturbance Report) (covering events in Odessa, Texas on May 9, 2021 and June 26, 2021); NERC and WECC, *Multiple Solar PV Disturbances in CAISO* (April 2022) (2021 Solar PV Disturbances Report) (covering four events: Victorville (June 24, 2021); Tumbleweed (July 4, 2021); Windhub (July 28, 2021); and Lytle Creek (August 26, 2021)); and NERC and Texas RE, *Panhandle Wind Disturbance, Texas Event: March 22, 2022*, (Aug. 2022) (Panhandle Wind Disturbance Report).

⁶⁰ Smaller scale events have occurred as well. However, there is less documentation of smaller scale events in part because NERC only tracks “Category 1” events, which are unexpected outages of three or more BES facilities, including interruptions of IBRs aggregated to a 500 MW threshold (Category 1a ii and Category 1i). *See, e.g.*, NERC, *ERO Event Analysis Process – Version 4.0*, at 2 (Dec. 2019), https://www.nerc.com/pa/rrm/ea/ERO_EAP_Documents%20DL/ERO_EAP_v4.0_final.pdf.

⁶¹ As unregistered IBRs do not have to comply with Reliability Standards or respond to NERC Alerts, it is difficult for NERC to perform root cause analyses of IBR-disturbance events that fully reflect unregistered IBR contributions to Bulk-Power System disturbances. *See e.g.*, 2021 Solar PV Disturbances Report at 13 (“non-BES facilities chose not to respond to the [requests for information] nor participate in any follow-up discussions to perform root cause analysis.”).

⁶² San Fernando Disturbance Report at 2.

power reduction, both observed at Bulk-Power System-connected solar PV IBRs.⁶³ In the San Fernando Disturbance Report, NERC found that many of the facilities that unexpectedly and adversely responded to the fault events were “non-BES solar PV [IBR] that had a noticeable effect on [Bulk-Power System] performance in aggregate.”⁶⁴ NERC explained that the performance of these types of IBRs “mirror the responses of the larger solar PV [IBR] facilities; [and] this is to be expected since the inverter manufacturer, make, and model are likely similar.”⁶⁵ The San Fernando Disturbance Report showed that the active power output response from two small solar PV IBRs during the disturbance responded to the normally cleared faults with their inverters entering momentary cessation and returning to service after several minutes.⁶⁶ During the event, about 1,000 MW of IBRs tripped or momentarily ceased operation; 112 MW or about 11% of those IBRs were unregistered IBRs.⁶⁷

26. During the summer of 2021, California experienced four solar PV IBR disturbance events. Similar to prior disturbances, these four events involved normally cleared transmission line faults and the loss of Bulk-Power System-connected solar PV IBRs.⁶⁸ NERC and WECC found that 13 non-BES connected solar PV IBRs contributed between almost 10% (in Lytle Creek, 58 MW of 600 MW) and almost 30% (in Tumbleweed, 162 MW of 566 MW) of the total losses. The report stated that the total number of non-BES connected solar PV IBRs may have been underestimated because the count only included solar PV IBRs with active power reduction of more than 10 MW.⁶⁹ As owners and operators of unregistered facilities are not required to respond to NERC Alerts (and therefore do not provide data to NERC), NERC was unable to perform a complete root cause analysis that included these facilities.⁷⁰

27. In its 2021 Solar PV Disturbances Report, NERC recognized the risk posed by non-BES connected IBRs, finding that “[t]he ongoing widespread [power] reduction of solar PV [IBR] resources continues to be a notable reliability risk to the [Bulk-Power

⁶³ *Id.* at vi.

⁶⁴ *Id.* at 23.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.* at app. B, tbl. B.1

⁶⁸ 2021 Solar PV Disturbances Report at 2.

⁶⁹ *Id.* at 36, app. B (providing a detailed review of affected facilities). NERC and WECC’s analysis was limited to solar PV IBRs that exhibited an active power reduction greater than 10 MW for the four disturbances.

⁷⁰ *Id.* at 13 (noting that “[n]on-BES facilities chose not to respond to the [requests for information] nor participate in any follow-up discussions to perform root cause analysis”).

System], particularly when combined with the additional loss of other generating resources on the [Bulk-Power System] and in aggregate on the distribution system.”⁷¹ Further, NERC has stated that “lack of data visibility and poor data quality continue to be a concern for comprehensive event analysis after large [Bulk-Power System] disturbances.”⁷²

28. Since the discernment of reliability issues related to IBRs in 2016, NERC has taken the following actions to assess and mitigate the impact of both registered and unregistered IBRs: (1) published seven reports documenting 12 events;⁷³ (2) issued two NERC Alerts;⁷⁴ (3) issued three reliability guidelines regarding IBR data collection and performance;⁷⁵ (4) formed an IBR performance task force (IRPTF)⁷⁶ and system planning impacts from distributed energy resources working group; (5) issued multiple technical

⁷¹ *Id.* at v.

⁷² Angeles Forest and Palmdale Roost Events Report at 23.

⁷³ Blue Cut Fire Event Report; Canyon 2 Fire Event Report; the San Fernando Disturbance Report; the Angeles Forest and Palmdale Roost Events Report; Odessa Disturbance Report; 2021 Solar PV Disturbances Report; and the Panhandle Wind Disturbance Report.

⁷⁴ NERC, *Loss of Solar Resources during Transmission Disturbances due to Inverter Settings* (June 2017) (Loss of Solar Resources Alert I); NERC, *Industry Recommendation Loss of Solar Resources during Transmission Disturbances due to Inverter Settings – II* (May 2018) (Loss of Solar Resources Alert II). All NERC Alerts referenced in this order are available on NERC’s website at <https://www.nerc.com/pa/rrm/bpsa/Pages/Alerts.aspx>.

⁷⁵ See NERC, *Reliability Guideline BPS-Connected Inverter-Based Resource Performance*, (Sept. 2018); IBR Interconnection Requirements Guideline; and NERC, *Reliability Guideline Performance, Modeling, and Simulations of BPS-Connected Battery Energy Storage Systems and Hybrid Power Plants* (Mar. 2021). NERC guidelines are a collection of best practices and are provided to the industry as voluntary guidance; they are not mandatory. All NERC guidelines referenced in this order are available on NERC’s website at <https://www.nerc.com/comm/Pages/Reliability-and-Security-Guidelines.aspx>.

⁷⁶ The task force became the IBR Performance Working Group in October 2020, and most recently became the IBR Performance Subcommittee in March 2022. For consistency, this order uses “IRPTF” to refer to all three iterations.

reports;⁷⁷ and (6) issued an IBR strategy document.⁷⁸ Nevertheless, NERC acknowledges that its actions to date have not successfully addressed the most common reliability issues posed by IBRs, like momentary cessation, nor have they resolved any modeling or other IBR-related performance issues from unregistered IBRs.⁷⁹

29. The NERC IRPTF May 2020 technical report explained that the “[i]nformation from only about one-half of the installed capacity of [Bulk-Power System]-connected solar PV resources (in the Western Interconnection) was collected as part of the NERC Alert process based on the size of resources and their designation as [BES] or non-BES resources. The extent of model accuracy for those resources that did not respond to the NERC Alert is unknown.”⁸⁰ Further, the report found that “[w]hile entities owning non-BES resources were requested to provide data, only BES resources are required to respond to the data requests in the NERC Alert.”⁸¹ As a consequence of not having the requested unregistered IBR data, the NERC IRPTF made modeling assumptions that only included roughly half (i.e., approximately 7 GW) of the existing solar PV IBRs in the WECC base case when performing system reliability studies to identify potential IBR reliability issues.⁸² In 2020, NERC and WECC conducted a review of the Western Interconnection base case transmission planning model and found numerous modeling errors and omissions regarding IBRs.⁸³

⁷⁷ See e.g., NERC, *Technical Report, BPS-Connected Inverter-Based Resource Modeling and Studies* (May 2020) (Modeling and Studies Report); NERC, *WECC Base Case Review: Inverter-Based Resources* (Aug. 2020), (WI Base Case IBR Review). All technical reports referenced in this order are available on NERC’s website at <https://nerc.com/comm/PC/Pages/Inverter-Based-Resource-Performance-Task-Force.aspx>.

⁷⁸ NERC IBR Strategy, *supra* note 6.

⁷⁹ See e.g., San Fernando Disturbance Report at 23; see also Odessa Disturbance Report at vi (finding that industry is aware of the guidance materials published by NERC yet are not comprehensively adopting those recommendations); see also NERC, *Agenda Member Representatives Committee*, at 16 (Apr. 2022) (stating that as NERC “continue[s] to observe, significant amounts of inverter-based resources cease or reduce energy production during system faults just when needed—this increasingly risky behavior impacts the reliable operation of the bulk power system”).

⁸⁰ Modeling and Studies Report at 2.

⁸¹ *Id.* at 25 n.34.

⁸² See *id.* at 24, 25 (finding that while the WECC base case reflects around 14,500 MW of Bulk-Power System-connected non-BES solar PV IBRs, only approximately 7,200 MW of Bulk-Power System-connected non-BES solar PV IBRs submitted data during the NERC Alert process).

⁸³ WI Base Case IBR Review Report. The WI base case has been updated since

30. In summary, events and disturbances have shown that IBRs, regardless of size and transmission or sub-transmission voltage, have a material impact on Bulk-Power System reliability. Further, while NERC recognizes that action is necessary to address the most common reliability issues posed by IBRs, these issues have not been resolved. Finally, even when NERC does address IBR-specific gaps through its Reliability Standards, until unregistered IBRs are registered, they will not be required to comply with the Reliability Standards.

B. Generator Owners and Operators of Unregistered IBRs that Materially Impact the Reliable Operation of the Bulk-Power System Must be Registered by NERC and Subject to Mandatory Reliability Standards

31. As IBR saturation continues to increase on the Bulk-Power System, we are concerned that, absent Commission action, larger numbers of unregistered IBRs may pose increasing risk to reliable operation, as demonstrated by the disturbance events described above. Therefore, we find it necessary to ensure that NERC register the owners and operators of those unregistered IBRs that, in the aggregate, have a material impact on Bulk-Power System reliability, to ensure those entities are subject to a relevant set of mandatory and enforceable Reliability Standard requirements.

32. Many IBRs have small individual generation capacities, are connected to the Bulk-Power System at less than 100 kV transmission or sub-transmission voltage, or do not meet one of the inclusions in the NERC BES definition, and therefore are not registered. Similarly, while NERC's materiality test can be used to assess whether an individual entity that does not meet the NERC BES definition has a material impact on the reliable operation of the Bulk-Power System, and thus should be registered with NERC and subject to its mandatory Reliability Standards, NERC has not, to date, applied the materiality test to unregistered IBRs to determine whether they, in the aggregate, have a material impact on the reliable operation of the Bulk-Power System. Therefore, NERC has not addressed through either its BES definition or the materiality test the impact of unregistered IBRs that, in the aggregate, materially impact the reliable operation Bulk-Power System. As a result, these potentially impactful unregistered IBRs are not required to comply with any Reliability Standards. To address this concern, we find that unregistered IBRs connected to the Bulk-Power System, regardless of size and transmission or sub-transmission voltage, that in the aggregate have a material impact on Bulk-Power System performance should be registered.

33. Based on the record of IBR facilities materially impacting the reliability of the Bulk-Power System discussed above, we find that the current BES definition and NERC's application of the materiality test to individual entities do not address the potential impacts to the reliability of the Bulk-Power System of the increasing numbers of smaller non-BES Bulk-Power System-connected IBRs. Therefore, we direct NERC to develop and file a work plan within 90 days of the date of this order explaining how it will identify and register unregistered IBRs that, in the aggregate, have a material impact

on the reliable operation of the Bulk-Power System, but that are not currently required to be registered with NERC under the BES definition. The work plan should explain how NERC will modify its processes to encompass unregistered IBRs (whether by working with stakeholders to change the BES definition, changing its Rules of Procedure related to registration, or some other solution) within 12 months of approval of the work plan. The work plan should also include implementation milestones ensuring that unregistered IBR owners and operators meeting the new registration criteria are identified within 24 months of the approval date of the work plan, and that they are registered and required to comply with applicable Reliability Standards within 36 months of the approval date of the work plan. The work plan will be noticed for public comment.

34. We recognize that the currently unregistered IBRs may not present the same impact in all circumstances as IBRs that fall under the current BES definition. Accordingly, NERC may determine that the full set of Reliability Standard Requirements otherwise applicable to generator owners and operators need not apply to currently unregistered IBR generator owners and operators when they are registered.⁸⁴ For example, NERC may determine that currently unregistered IBR generator owners and operators that must register as a result of this order need comply only with provisions pertaining to facility interconnections and studies, protection systems, modeling, voltage support, and frequency response, as well as any new or modified standards developed through the rulemaking in Docket No. RM22-12-000. While we provide the above by way of example, NERC may, subject to Commission review and approval, determine whether specific provisions from the full set of Reliability Standard Requirements otherwise applicable to generator owners and operators need not apply to generator owners and operators when they are registered that currently only own unregistered IBRs.

35. Accordingly, consistent with the discussion in this order, we direct NERC to file the work plan within 90 days of the date of this order for Commission approval. The work plan filed by NERC will be noticed for public comment. Once the Commission approves the work plan, we direct NERC to file progress updates every 90 days from the date of approval documenting NERC's progress. We direct NERC to complete implementation of the work plan (whether by working with stakeholders to change the BES definition, changes to its registration program, or some other solution) within 12 months from the date of Commission approval of the work plan and to complete the identification of unregistered IBR owners and operators within 24 months from the date of Commission approval, so that they are registered and required to comply with applicable Reliability Standards within 36 months from the date of Commission approval of the work plan.

III. Information Collection Statement

36. The Paperwork Reduction Act (PRA)⁸⁵ requires each federal agency to seek and obtain approval by the Office of Management and Budget (OMB) before undertaking a

⁸⁴ See, e.g., *New Harquahala Generating Co., LLC*, 123 FERC ¶ 61,173 (2008).

⁸⁵ 44 U.S.C. 3501-3521.

collection of information (including reporting, record keeping, and public disclosure requirements) directed to ten or more persons or contained in a rule of general applicability. OMB regulations⁸⁶ require approval of certain information collection requirements (including deletion or revision of existing requirements, or implementation of new requirements). Upon approval of a collection of information, OMB will assign an OMB Control Number and an expiration date. Respondents subject to the filing requirements will not be penalized for failing to respond to the collection of information unless the collection of information displays a valid OMB control number.

37. The information collection affected by this order is FERC-725, “Certification of Electric Reliability Organization; Procedures for Electric Reliability Standards” (OMB Control Number 1902-0225). The information collection requirements in this order are covered by and included in, the existing OMB-approved FERC-725.⁸⁷

38. This order directs the ERO to develop and submit to the Commission for approval within 90 days of the date of this order a work plan describing, in detail, how the ERO plans to modify its registration processes to identify and register owners and operators of unregistered IBRs that in the aggregate, materially impact the reliable operation of the Bulk-Power System, as discussed in the body of this order. NERC is required to submit progress updates every 90 days after approval of the work plan.

39. In this order, NERC is directed to: (1) complete modifications to its registration process within 12 months of Commission approval of the work plan; (2) complete identification of owners and operators of IBRs that are connected to the Bulk Power System and that, in the aggregate, materially impact the reliable operation of the Bulk-Power System within 24 months of Commission approval of the work plan; and (3) complete registration of unregistered IBR owners and operators so they are required to comply with applicable Reliability Standards within 36 months of Commission approval of the work plan, as discussed in the body of this order.

40. The Commission solicits comments on the Commission’s need for the revision of the information collection, whether the information will have practical utility, the accuracy of the burden estimates, ways to enhance the quality, utility, and clarity of the information to be collected or retained.

41. Interested persons may submit questions about this information collection by contacting Ellen Brown, Office of the Executive Director, at DataClearance@ferc.gov, or (202) 502-8663. Please send comments concerning the collection of information and the associated burden estimates to: Office of Information and Regulatory Affairs, Office of Management and Budget [Attention: Federal Energy Regulatory Commission Desk

⁸⁶ 5 CFR pt. 1320 (2021).

⁸⁷ FERC-725 includes the burden, reporting, and recordkeeping requirements associated with Reliability Standards Development, Reliability Assessments, Self-Assessment and ERO Application, Reliability Compliance, Stakeholder Survey, and Other Reporting.

Officer]. Due to security concerns, comments should be submitted at www.reginfo.gov/public/do/PRAMain. Comments submitted to OMB should be sent within 60 days of publication of this notice in the Federal Register and refer to FERC-725 and OMB Control No. 1902-0225.

The Commission orders:

(A) NERC is hereby directed to submit a work plan within 90 days of the date of this order describing, in detail, how it plans to modify with stakeholder input its BES definition, registration program, or some other solution to identify and register owners and operators of unregistered IBRs that are connected to the Bulk-Power System and that, in the aggregate, materially impact the reliable operation of the Bulk-Power System, as discussed in the body of this order.

(B) NERC is hereby directed to complete modifications in accordance with its work plan within 12 months of Commission approval of the work plan, complete identification of owners and operators of IBRs that in the aggregate, materially impact the reliable operation of the Bulk-Power System within 24 months of Commission approval of the work plan, and complete registration of IBR owners and operators so they are required to comply with applicable Reliability Standards within 36 months of Commission approval of the work plan, as discussed in the body of this order.

(C) NERC is hereby directed to file detailed progress updates on the status of its workplan, completed implementation milestones, and any delays, every 90 days from the date of Commission approval of the work plan, as discussed in the body of this order.

By the Commission. Commissioner Danly is concurring with a separate statement attached.

Issued: November 17, 2022.

Debbie-Anne A. Reese,
Deputy Secretary.

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Registration of Inverter-based Resources

Docket No. RD22-4-000

(Issued November 17, 2022)

DANLY, Commissioner, *concurring*:

1. I concur in today's order.¹ I remain gravely concerned about the North American Electric Reliability Corporation's (NERC) inability to act swiftly and nimbly in response to emerging risks that threaten the reliability of the Bulk-Power System (BPS). This is due in no small part to the statutory framework of Federal Power Act (FPA) section 215.² According to NERC's Inverter-Based Resource (IBR) Strategy document,³ "[t]he [Electric Reliability Organization (ERO)] Enterprise has analyzed numerous widespread IBR loss events and identified many systemic performance issues with the inverter-based fleet *over the past six years*."⁴ NERC explains that "[t]he disturbance reports, alerts, guidelines, and other deliverables developed by the ERO thus far have highlighted that abnormal IBR performance issues pose a significant risk to BPS reliability."⁵ Our actions today in this and another proceeding⁶ propose firm deadlines by which NERC must act to register and hold IBR entities accountable for failure to comply with mandatory and enforceable Reliability Standards.

2. Better late than never, I suppose. Nevertheless, it could be at least four years before certain of the IBR entities are registered and another five years before the full suite of contemplated requirements are mandatory and enforceable. So, it will be about ten or eleven years *after* the significant reliability risk was definitively identified that we will have required registration and Reliability Standards in place. The reliability consequences that attend the rapid deployment of an unprecedented number of IBRs are, at this point, unarguable. As NERC's President and CEO explained last week: "the pace of the transformation of the electric system needs to be managed and that transition needs to occur in an orderly way."⁷ Mandatory reliability standards must be implemented as

¹ *Registration of Inverter-based Resources*, 181 FERC ¶ 61,124 (2022).

² 16 U.S.C. § 824o.

³ NERC, *Inverter-Based Resource Strategy: Ensuring Reliability of the Bulk Power System with Increased Levels of BPS-Connected IBRs* (Issued Sep. 14, 2022), https://www.nerc.com/comm/Documents/NERC_IBR_Strategy.pdf.

⁴ *Id.* at 3.

⁵ *Id.* at 5.

⁶ *Reliability Standards to Address Inverter-Based Resources*, 181 FERC ¶ 61,125 (2022).

⁷ Statement of James B. Robb, Annual Commissioner-led Reliability Technical

quickly as possible to ensure the reliable operation of the BPS. We at FERC are responsible for the reliability of the BPS under FPA section 215. I fear we may be taking too long to address reliability challenges that urgently need our attention.

For these reasons, I respectfully concur.

James P. Danly
Commissioner

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Conference (Nov. 10, 2022), <https://www.ferc.gov/news-events/events/annual-commissioner-led-reliability-technical-conference-11102022>.